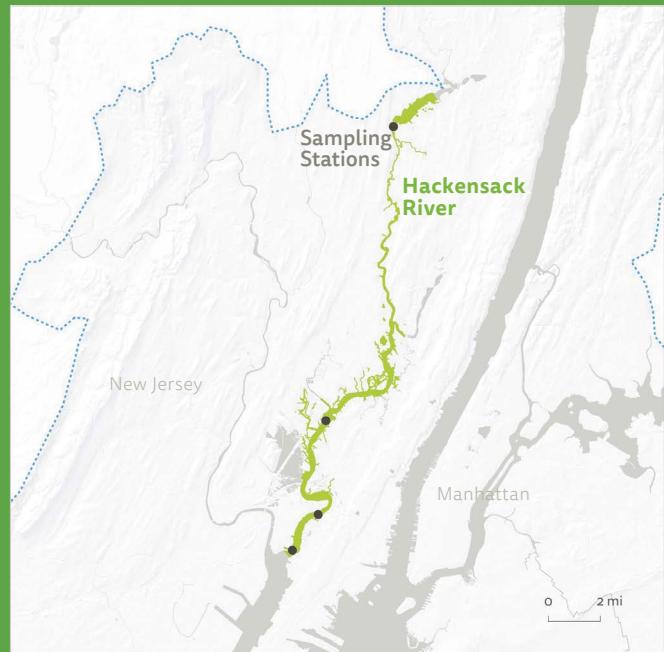


Regional Waterbody Summary

Hackensack River

The Hackensack River flows roughly parallel to the Hudson River, from New York State into New Jersey, where it merges with Newark Bay. Most of the watershed lies within Rockland County, NY and the New Jersey counties of Bergen and Hudson. The completion of the Oradell Dam in 1923 greatly changed the makeup of the river's lower reaches, impounding a northern freshwater system above the dam, and creating a brackish estuary system south of it. This lower, tidal portion of the Hackensack River flows through the Hackensack Meadowlands, a complex of wetlands that includes extensive salt marshes. This rich ecosystem is home to several rare, threatened and endangered plant and animal species. There are popular riverside parks in Hackensack, Teaneck, Secaucus, and Carlstadt; and the Meadowlands Environmental Center at Richard W. DeKorte Park in Lyndhurst is a gateway to the Meadowlands.

The industrialized and commercialized land surrounding the lower Hackensack River has made it subject to a long history of pollution. The state reports to EPA through their 303(d) and 305(b) lists impairments to aquatic life and fish consumption, though secondary contact recreation is deemed supported. Large portions of this region are impaired due to benzo[a]pyrene (PAHs),



chlordan in fish tissue, DDT in fish tissue, dieldrin, dioxin (including 2,3,7,8-TCDD), heptachlor epoxide, mercury in fish tissue, PCBs in fish tissue, and CSOs. TMDLs are needed for all aforementioned causes of impairment. A TMDL has been completed for nickel.

Waterbody	Water Class NJAC 7: 9B-1.14(d)(1)	Water Quality Criteria	
		Pathogenic Bacteria (cfus/100mL)	Dissolved Oxygen (mg/L)
Upper Hackensack River	Class SE1: Shellfish and Bathing	<i>Enterococcus</i> : Monthly GM \leq 35 or a single sample max $>$ 104	Never $<$ 4.0 at any time
			24-hour average \geq 5.0
Hackensack River	Class SE2: Fishing and Fish Propagation	Fecal Coliform: Monthly GM \leq 770	Never $<$ 4.0
Lower Hackensack River	Class SE3: Fishing and Fish Migration	Fecal Coliform: Monthly GM \leq 1,500	Never $<$ 3.0

Water Quality Monitoring in the Harbor Estuary

This regional waterbody summary, prepared by the New York-New Jersey Harbor and Estuary Program (HEP) and partners, provides a brief analysis of select water quality data to illustrate the progress toward achieving the fishable and swimmable goals of the Clean Water Act in the Hackensack River. It is a companion to HEP's 2021 *Harbor-Wide Water Quality Monitoring Report* (available at www.hudsonriver.org/harborwidewqreport-2021), which presents water quality data collected from 2010 to 2017 from both New York and New Jersey across all 10 different regions of the Harbor Estuary. The full report analyzes four water quality parameters against federal recreational water quality recommendations and guidance documents as well as state water quality standards and criteria, and discusses achievements to date and efforts still needed to achieve fishable and swimmable waters.

This regional waterbody summary describes water quality and key challenges and opportunities for improvement relative to New York's and/or New Jersey's state standards and criteria as of 2020 for pathogenic bacteria (e.g. fecal coliform, Enterococci, and *E. coli*) and dissolved oxygen. In the case where multiple water quality standards and criteria are used in a regional waterbody, the highest criteria that is supportive of primary or secondary contact is displayed as the threshold. For swimmable waters, pathogen levels must meet a state's criteria and designated use (i.e., supporting secondary or primary contact recreation). The potential future standard of *Enterococcus* is also discussed where applicable. For fishable waters, dissolved oxygen levels must meet and/or exceed the state's criteria and levels of total nitrogen and chlorophyll-a must show at least fair conditions to support aquatic life. Potential investments and opportunities for improvement are showcased, including the National Pollutant Discharge Elimination System (NPDES) and Long Terms Control Plan (LTCP) permits used by the states of New York and New Jersey to reduce pollution



and ensure designated uses of each waterbody are met. Total Maximum Daily Loads (TMDLs) are another tool used by the states and EPA to determine the amount of a pollutant that a waterway can take in and still meet their designated uses and water quality criteria.

Data presented were collected primarily between June 1 and September 30, and compiled from two comparable harbor surveys conducted by the New York City Department of Environmental Protection (NYCDEP) and by the New Jersey Harbor Dischargers Group (NJHDG). As available, select secondary data sources were used to complement results from these two primary data sources. More information on data analysis methods can be found in the full report.

The full report and this regional waterbody summary does not serve to replace New York's or New Jersey's Integrated Water Quality Reports, nor are they meant to be used for compliance purposes. Proposed rulemaking to amend standards and/or criteria introduced by the states are also not explored in this report.

Waterbody Classes

New Jersey Waterbody Classes

- FW2-NT (Fishing / Fish Propagation / Bathing)
- SE1 (Shellfish / Bathing)
- SE2 (Fishing / Fish Propagation)
- SE3 (Fishing / Fish Migration)

New York Waterbody Classes

- SA (Shellfish)
- SB (Bathing)
- I (Fishing / Boating)
- SD (Fish Survival)

0 5 miles

NY/NJ
HARBOR
& ESTUARY
PROGRAM

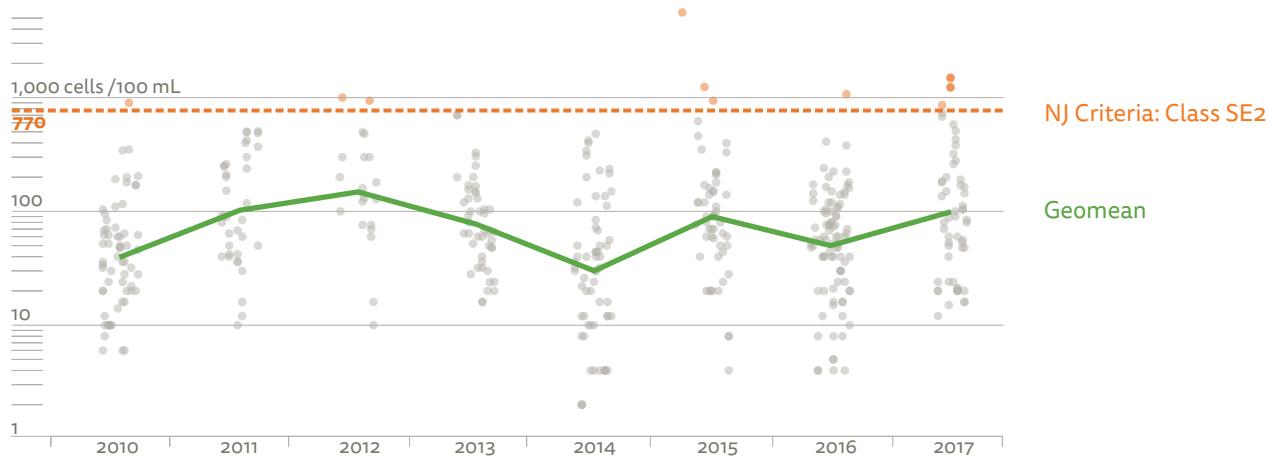
HUDSON
RIVER
FOUNDATION

Pathogens

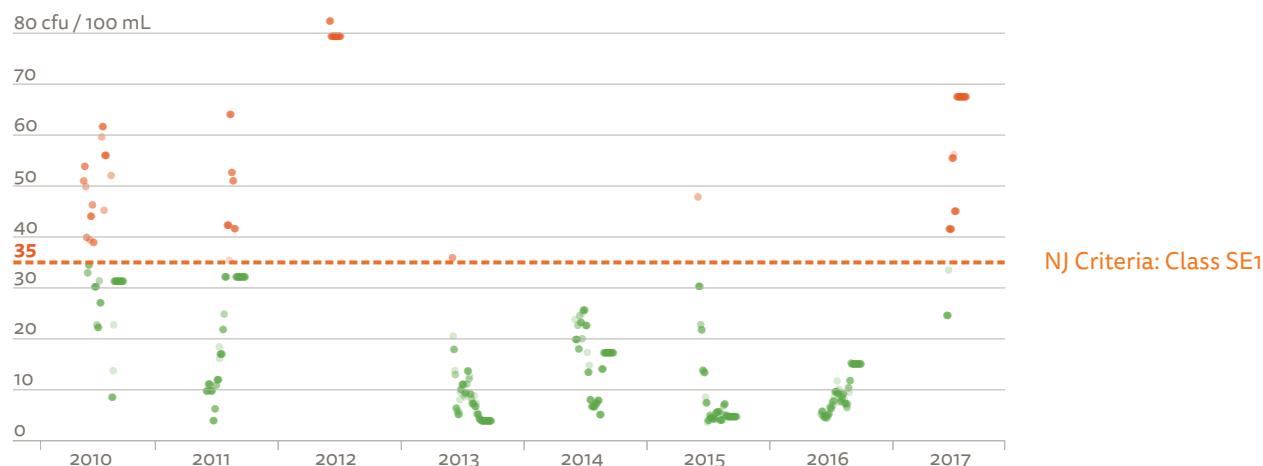
The presence of pathogenic bacteria can limit recreational use of these waterways. Sampling data show variability over time, but the geometric means show compliance when it comes to Class SE2 criteria for fecal coliform and is supportive of secondary contact recreation. Samples tested for *Enterococcus* criteria, applicable only to the upper portion of the Hackensack River by the Oradell Reservoir, show more inconsistency and limit primary contact recreation. For example, in 2017, 88% of samples were out of compliance while the previous four years had less than 3% that were non-compliant for *Enterococci*. The

fecal coliform summer discreet measurements ranged from 2 cfu/100mL to 5,600 cfu/100mL over the eight-year period. With an average of 75 discrete samples per recreational season (June-September) per year, the average geomean for fecal coliform in this region is 80 cfu/100mL. *Enterococcus* summer discrete measurements ranged from 3.6 cfu/100mL to 113 cfu/100mL over the same periods. Out of over 550 samples, the average geomean of *Enterococci* for this region is 24 cfu/100mL and 12.4% of discrete samples exceeded the single sample maximum (> 104 cfus/100mL) *Enterococcus* criterion.

Fecal Coliform, Summer Surface Bottom and Discrete Samples



Enterococcus, 30 Day Moving Geomean



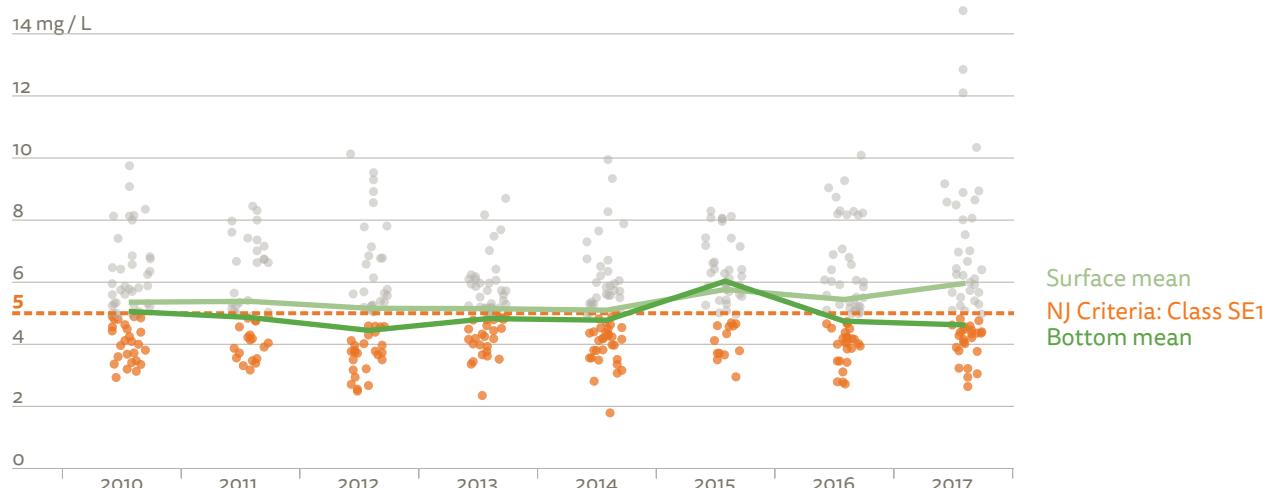
Dissolved Oxygen

Dissolved oxygen (DO) is a critical measure of habitat quality for fish and other wildlife. It is measured at the surface, where sunlight can penetrate to generate photosynthesis, as well as at the bottom, where sunlight is less available. In general, bottom DO concentrations are consistently lower than surface DO concentrations. Daily average concentrations are in compliance with the DO criteria throughout the eight years evaluated. In general, fish in this region are consistently stressed. The minimum discrete samples do fall close to EPA's suggested threshold of 2.3 mg/L, which is indicative of hypoxic conditions. The percent of time DO samples were less than 4 mg/L was between 15-34% for surface DO and 13-29% for bottom DO. The percent of time DO samples were less than 5 mg/L has been between 30-53% for surface DO and 31-67% for bottom DO.

The Meadowlands Environmental Research Institute (MERI) has also been monitoring approximately 14 sampling stations in this region since 2010 and has two continuous monitoring stations to measure DO at the River Barge Park Marina and Kearny, adjacent to the NJ Transit Lower Hack Bridge. Samples from MERI and the NJHDG show similar conditions for DO in the lower portions of the river, near the Meadowlands district. However, the data collected by MERI at the River Barge Park Marina, in the upper portions just above the Meadowlands district near NJHDG's station 14, show slightly more severe conditions. Both data sources reach the same overall conclusion the Hackensack River exhibits below desirable DO levels when compared to the SE2 criteria and more so when compared to EPA's guidance of 4.8 and 2.3 mg/L.

Data Source	Average (mg/L)	% of Samples < 4.8 mg/L	% of Samples < 2.3 mg/L	% of Samples < 4.0 mg/L
NJHDG (Upper Portion)	6.0	42	0	15
MERI - Barge (Upper Portion)	4.6	65	11	46
NJHDG (Lower Portion)	4.3	55	0	25
MERI - Kearny (Lower Portion)	4.9	46	0	15

Dissolved Oxygen, Summer Mean, Surface and Bottom



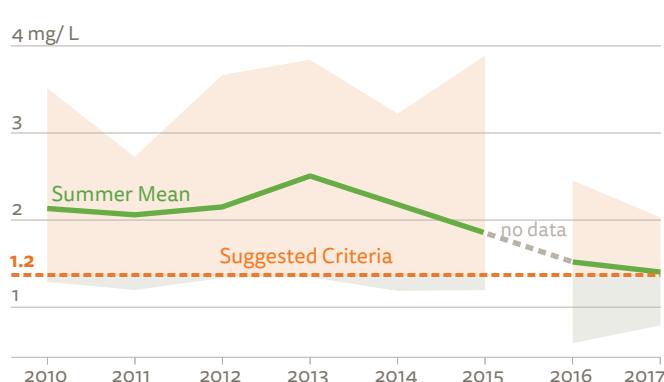


Other Water Quality Parameters

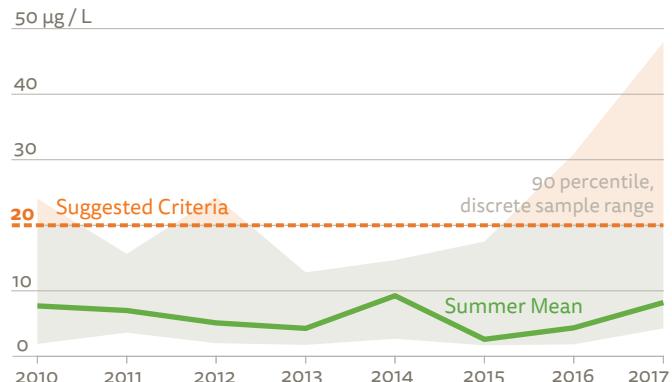
While pathogenic bacteria and dissolved oxygen are the primary criteria used to set water quality standards in New Jersey, measurement of total nitrogen and chlorophyll-a provide additional information as to possible causes of low DO as well as the presence of photosynthetic algae and algal blooms. Between 2010 and 2017, the summer means for total nitrogen ranged between 1.41 and 2.51 mg/L, though daily values fluctuated over time and

data was not available in 2015. Total nitrogen levels between 0.4 and 1.2 mg/L is indicative of fair conditions, and water quality would improve with nitrogen levels equal to or below 0.4 mg/L. Chlorophyll-a levels in this region show an upward increase beginning in 2015. Concentrations of 5 µg/L or below support healthier habitats for fish survival and propagation, while concentrations at or above 20 µg/L increase algal growth.

Total Nitrogen, Summer Mean



Chlorophyll-a, 90th percentile Surface



Investments and Opportunities for Improvement

EPA and New Jersey have identified CSOs as a key source of pathogenic bacteria (and other pollutants) that limit recreational use. Four of New Jersey's 25 CSO permit holders are located in this region, and each is responsible for producing a Long Term Control Plan (LTCP). These plans are intended to reduce the number of CSOs, therefore improving water quality through the management of pathogens. New Jersey LTCPs, submitted to the state in 2020, have a long term (20-40 year) implementation process. New Jersey municipalities' planned investments through the LTCPs range from \$15.8 million to upwards of \$859 million per each of the CSO permit holders in the region (NJDEP, 2019; NJDEP, 2020). Potential investments towards the implementation of chemical disinfection of discharge using Peracetic acid (PAA), storage tunnels or tanks, and green infrastructure should result in significant improvements to water quality in the region. In addition, MS4 permits in the region address stormwater quality issues related to new development, redevelopment and existing development.

With the implementation of LTCPs and efforts to prevent pollution through the MS4 permits, a reduction in pathogens is anticipated, specifically for fecal coliform and Enterococci, and nutrients. New Jersey CSO permittees are required to consider green infrastructure as a CSO alternative in their current planning phase before the submittal of LTCPs. Green infrastructure projects such as the conversion of impervious surface into rain gardens should reduce levels of nutrient loading and total suspended solids by managing stormwater runoff in the region. The Meadowlands is also home to several Superfund sites and a recent EPA interim plan will invest an additional \$18.6 million in the region to remove 16,300 cubic yards of sediment from the cleanup area at the Universal Oil Products site in East Rutherford (NJDEP, 2019; NJDEP, 2020). Further efforts by the Bergen County Utilities Authority, a POTW in the region, to reduce nitrogen loadings will support healthier habitats for fish survival and propagation as well as potentially reduce the occurrence of algal blooms in this region.